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HAIR COSMETIC INGREDIENT

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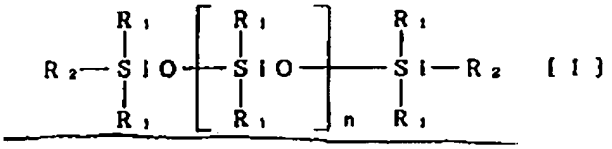
Specification

1. Title of the invention

Hair cosmetic ingredient

2. Patent Claim

1. A hair cosmetic ingredient characterized by the inclusion of one, two, or more types of high-molecular-weight silicones represented by the following general formula I and one, two, or more types of mucopolysaccharides:



(I)

(R_1 signifies a methyl group or partial phenyl group, whereas R_2 signifies a methyl group or hydroxyl group; moreover, n signifies an integer of 3,000 ~ 20,000).

3. Detailed explanation of the invention

(Industrial application fields)

The present invention concerns a hair cosmetic ingredient capable of conferring luster & silkiness onto hair, of yielding excellent conditioning effects, and of sustaining these effects over relatively long periods.

(Prior art)

Generally speaking, it is well-known that, in cases where hairs are subjected to frequent & repeated beautifying treatments such as shampooing, brushing, dryer heating, applications or hair

[1] Numbers in the margin indicate pagination in the foreign text.

colors & bleach agents, etc., the hairs become severely damaged, resulting in dry & bulky hairs, proliferations of branched hairs, severed hairs, & hair losses, and hair strength losses.

Attempts have therefore been made to protect hairs from the aforementioned damages and/or to repair such damages by mixing, as hair cosmetic matrix agents, various raw ingredients extracted from natural substances such as proteins, polysaccharides, extracts, natural polymers, and mono- or oligo-ordered matters inclusive of these constituent components such as amino acids, peptides, etc.

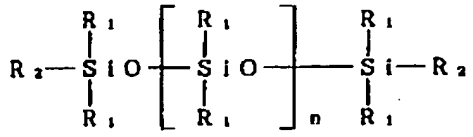
(Problems to be solved by the invention)

Raw ingredients extracted from natural substances are fairly effective from standpoints of preventing hair damages and of protecting hairs from chemical or mechanical treatments, although none of them can yet to be said to be satisfactory for reasons of insufficient contiguities with hairs, inferior tactile properties (e.g., lack of silkiness of treated hairs, etc.). /2

The objective of the present invention is therefore to provide a hair cosmetic ingredient capable of preventing hair damages, of protecting hairs from chemical or mechanical treatments, and concomitantly of optimizing hair combability by conferring silkiness & flexibility onto hairs.

(Mechanism for solving the problems)

In other words, the present invention concerns a hair cosmetic ingredient characterized by the inclusion of one, two, or more types of high-molecular-weight silicones represented by the following general formula I and one, two, or more types of mucopolysaccharides:



(R_1 signifies a methyl group or partial phenyl group, whereas R_2 signifies a methyl group or hydroxyl group; moreover, n signifies an integer of 3,000 ~ 20,000).

In the following, the constitution of the present invention will be explained in detail.

The high-molecular-weight silicone used in the present invention is represented by the aforementioned general formula I, whereas the n value in the formula is confined to a range of 3,000 ~ 20,000, based on which attributes characteristic of soft rubbers manifest at normal temperature. They are concretely instantiated by dimethylpolysiloxane, methylphenylpolysiloxane, hydroxyl group-terminated dimethylpolysiloxane, hydroxyl group-terminated methylphenylpolysiloxane, etc.

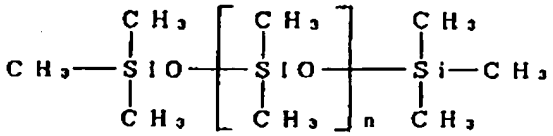
The mixing ratio of the high-molecular-weight silicone with respect to the total weight of the hair cosmetic ingredient is designated within a range of 0.1 ~ 50 wt%, preferably 1 ~ 30 wt%. In a case where this ratio is lower than 0.1%, it becomes impossible to achieve sufficient effects, whereas in a case where the same exceeds 50%, the solubility diminishes.

Mucopolysaccharides used in the present invention are instantiated by hyaluronic acid, chondroitin tetrasulfate. chondroitin octasulfate, dermatan sulfate. chondroitin 4,8-disulfate, dermatan 4,8-disulfate, keratan sulfate, heparan sulfate, and their salts. Of these, hyaluronic acid, chondroitin tetrasulfate. chondroitin octasulfate, and their salts are especially desirable.

It is desirable for the mixing ratio of the mucopolysaccharide(s) used in the present invention with respect to the total weight of the hair cosmetic ingredient to be designated within a range of 0.001 ~ 10 wt%, preferably 0.01 ~ 5 wt%. In a case where this mixing ratio is lower than 0.001 wt%, the mixing effect of the mucopolysaccharide(s) fails to manifest, whereas in a case where the same exceeds 10 wt%, it is undesirable in consideration of usability in that the viscosity becomes elevated to an excessively high level.

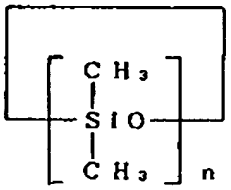
In a case where the high-molecular-weight silicone of the present invention is mixed, it is desirable to use a solution obtained by solubilizing the same into volatile oil components such as a low-boiling-point linear silicone oil, low-boiling-point cyclic silicone oil, low-boiling-point isoparaffinic hydrocarbons, fluorochloro-substituted derivatives of hydrocarbons, etc. It goes without saying that said silicone can be mixed separately with the hair cosmetic ingredient and then solubilized within the resulting system.

The low-boiling-point linear silicones are represented by the following formula, and their concrete examples include hexamethyldisiloxane, octamethyltrisiloxane, decamethyltetrasiloxane, hexadecamethylheptasiloxane, etc.



(In the formula, n signifies an integer of 0 ~ 5).

The cyclic silicones are represented by the following formula, and their concrete examples include octamethylcyclotetrasiloxane, decamethylcyclopentasiloxane, tetradecamethylcycloheptasiloxane, etc.



(In the formula, n signifies an integer of 3 ~ 7).

Isoparaffinic hydrocarbons the boiling points of which at normal pressure are confined to a range of 60 ~ 200°C may be used as the low-boiling-point isoparaffinic hydrocarbons, and they may, for example, be instantiated by Isoper (registered trademark) A, same C, same D, same E, /3 same G, same H, same K, same L, & same M manufactured by EXXON Co., Shellsol (registered trademark) 71 manufactured by Shell Co., and Saltrol (registered trademark) 100, same 130, & same 220 manufactured by Phillips Co.

The fluorochloro-substituted derivatives of hydrocarbons are instantiated by trichlorotrifluoroethane, tetrachlorodifluoroethane, etc.

Arbitrary one, two, or more types can be used as the aforementioned low-boiling-point oil(s), and it is desirable for the total mixing ratio with respect to the high-molecular-weight silicone to be 1 ~ 50 equivalents (weight).

Moreover, it is also possible to add low-molecular-weight alcohols such as ethanol, isopropyl alcohol, etc. in addition to the aforementioned components.

Agent morphologies of the present invention may be arbitrarily selected, and any of solubilized systems, emulsified systems, powder dispersion systems, oil-water double-layer systems, oil-water-powder triple-layer systems, etc. may be used.

In the case of an emulsified system, an oil phase inclusive of the high-molecular-weight silicone is generally emulsified by using a nonionic surfactant, cationic surfactant, anionic surfactant, or their mixture(s), and in such a case, a method wherein a mixture of a surfactant(s) and a water-soluble polyvalent alcohol is preliminarily prepared and wherein an emulsified composition is provided by mixing the obtained mixture with an oil phase is desirable. Usable polyvalent alcohols are instantiated by propylene glycol, 1,3-butanediol, dipropylene glycol, glycerin, polyglycerins (e.g., diglycerin, triglycerin, etc.), trimethylolethane, trimethylolpropane, erythritol, pentaerythritol, sorbitan, glucose, sorbitol, maltitol, sucrose, raffinose, trehalose, polyoxyethylene methyl glucoside, polyoxypropylene methyl glucoside, etc. They may be used either alone or in combination of two or more types on an occasion for preparing the emulsified composition. As oils constituting the oil phase, furthermore, the following optional oils may also be used together with the high-molecular-weight silicone. In other words, such oils are instantiated by oils & fats (e.g., olive oil, coconut oil, safflower oil, castor oil, cottonseed oil, etc.), waxes (e.g., lanolin, jojoba oil, carnauba wax, etc.), hydrocarbon oils (e.g., fluid paraffin, squalene, vaseline, volatile isoparaffin, etc.), fatty acids, alcohols, ester oils (e.g., cetyl octanate, isopropyl myristate, etc.), silicone oils (e.g., dimethylpolysiloxane, methylphenylpolysiloxane, etc.), silicone resins, etc.

Depending on sought objectives, furthermore, it is also possible to add, in addition to the aforementioned components, other chemicals, perfumes, etc. such as water-soluble polymers, chelating agents, antioxidants, ultraviolet absorbents, preservatives, vitamins, hormones, etc. to the hair cosmetic ingredient of the present invention within qualitative & quantitative ranges that do not hinder the effects of the present invention.

(Effects of the invention)

The hair cosmetic ingredient of the present invention is a hair cosmetic ingredient capable of conferring rich luster & silkiness onto hair, of yielding excellent conditioning effects, and of sustaining these effects over relatively long periods.

(Application examples)

In the following, the present invention will be explained in further detail with reference to application examples. The present invention, however, is not limited to these examples. The mixing ratio is invariably expressed by "wt%."

Application Example 1: Hair oil

(1): Decamethylcyclopentasiloxane: 75

(2): Trichlorotrifluoroethane: 7

(3): Ethanol (99%): 10

(4): Isopropyl alcohol: 3

(5): Dimethylpolysiloxane (R_1 & R_2 are both methyl groups, n = 5,000): 4

(6): Hyaluronic acid: 1

(7): Perfume: Some

(1) ~ (7) were mixed, solubilized, and agitated. A liquid hair oil with a viscosity of 900 cps was obtained.

Application Example 2: Hair spray

(1): Decamethylcyclopentanesiloxane: 10

(2): Dimethylpolysiloxane (R_1 & R_2 are each methyl groups, n = 4,000): 1

(3): Chondroitin 4,8-disulfate: 0.001

(4): Trichloromonofluoromethane: 28

(5): Dichlorodifluoromethane: 59.999

After a solubilized mixture of (1) ~ (3) had been filled [into a can?], the propellant gases (4) & (5) were filled into the same, as a result of which an aerosol spray was obtained. /4

Application Example 3: Foamy aerosol

(1): Octamethylcyclotetrasiloxane: 31.8

(2): Dimethylpolysiloxane (R_1 & R_2 are each methyl groups, n = 20,000): 2

(3): Hyaluronic acid: 0.1

(4): Chondroitin octasulfate: 0.1

(5): Propylene glycol: 6

(6): Polyoxyethylene (80 mole adduct) cured castor oil ester: 2

(7): Cationized cellulose (Polymer JR-400, manufactured by UCC Co.): 0.2

(8): Ion-exchanged water: 47.8

(9): Dimethyl ether: 4

(10): Dichlorodifluoromethane: 6

A solubilized mixture of (1) & (2) was added to a solution of (5) & (6), and the obtained mixture was emulsified. Next, the aforementioned emulsified mixture was added to a solution of (3), (4), (7), & (8). Next, the obtained feed liquid mixture was filled into a can, and after the propellant gases (9) & (10) had been filled into the same, a foamy aerosol was obtained.

Application Example 4: Hair cream

(1): Decamethylcyclopentanesiloxane: 10

(2): Dimethylpolysiloxane (R_1 & R_2 are each methyl groups, n = 5,000): 3

(3): Dimethylsiloxane (20 cps): 5

(4): Glycerin tri-2-ethylhexanate: 8

(5): Vaseline: 5

(6): Stearyl alcohol: 2

(7): Sorbitan monooleate: 2

(8): Po[ly]oxyethylene (40 mole adduct) cured castor oil ester: 2

(9): Glycerin: 5

(10): Hyaluronic acid: 5

(11): Preservative: Some

(12): Ion-exchanged water: Balance

(1) ~ (8) were agitated & solubilized at 70°C, and after a solution of (9) ~ (12) had been added to the obtained solution, the contents were emulsified, as a result of which a hair cream was obtained.

Comparative Example 1

(1): Octamethylcyclotetrasiloxane: 22

(2): Propylene glycol: 6

(3): Polyoxyethylene (80 mole adduct) cured castor oil ester: 2

(4): Hyaluronic acid: 10

(5): Ion-exchanged water: 50

(6): Dimethyl ether: 4

(7): Dichlorodifluoromethane: 6

A foamy aerosol was obtained based on an ordinary method.

Comparative Example 2

(1): Vinylpyrrolidone-vinyl acetate copolymer: 2

(2): Chondroitin tetrasulfate: 2

(3): Propylene glycol: 2

(4): Ethanol: 40

(5): Ion-exchanged water: 55

A transparent liquid hair lotion was obtained based on an ordinary method.

The properties or functions & effects of the products of the present invention obtained above in Application Examples 1 ~ 4 and products of the prior art obtained in Comparative Examples 1 & 2 are shown in Table I.

Table I

	Combability	Luster	Lasting silkiness & luster after shampooing
Application Example 1	○	○	○
Application Example 2	○	○	○
Application Example 3	○	○	○
Application Example 4	○	○	○
Comparative Example 1	Δ	Δ	×
Comparative Example 2	×	×	×

The test methods & evaluation methods in Table I are shown below.

Combability

After 2 g of each sample had been coated on a hair strand (4 g), the latter was neatly /5

shaped with a comb, and after it had been dried for 1 hour, its combability was evaluated.

O: Smooth

Δ: Somewhat rough

X: Rough

Hair luster

After 3 g of each sample had been coated on divided left & right halves of head hairs, the latter were neatly shaped with a comb, and sensory evaluations were then rendered.

O: Luster present

Δ: Somewhat inferior luster

×: Luster absent.

Lasting silkiness & luster after shampooing

After 2 g of each sample had been coated on a hair strand (4 g), the latter was dried over a 5-hour period, and after it had then been immersed within a 10% shampoo solution over a 1-min. period, it was washed with a flowing warm water over a 1-min. period, dried for 1 hour, and then evaluated in terms of silkiness & luster.

O: Unhindered combability and luster present

Δ: Somewhat hindered combability and marginal luster

×: Hindered combability & luster absent

Application Example 5: Hair oil

(1): Decamethylcyclopentasiloxane: 66.999

(2): Dimethylpolysiloxane (R_1 & R_2 are each methyl groups, n = 3,000): 10

(3): Chondroitin hexasulfate: 0.001

(4): Dimethylpolysiloxane (20 cps): 3

(5): Trichlorotrifluoroethane: 20

(1) ~ (5) were mixed, agitated, & solubilized. A liquid hair oil with a viscosity of 1,500 cps and an excellent transparency was obtained.

Application Example 6: Hair oil

(1): Decamethylcyclopentasiloxane: 80

(2): Octamethylcyclotetrasiloxane: 16.7

(3): Methylphenylpolysiloxane (R_1 is a methyl group : phenyl group = 1 : 1 mixture, whereas R_2 is a methyl group, n = 15,000).

(4): Hyaluronic acid: 0.1

(5): Water-soluble collagen: 0.1

(6): Amino-modified silicone oil (Silicone KF857, manufactured by Toray Silicone Co.; viscosity: 70 cps; amine equivalent: 830): 0.1

A liquid hair oil with a viscosity of 500 cps was obtained according to procedures similar to those in Application Example 1.

Application Example 7: Hair spray

(1): Octamethylcyclotetrasiloxane: 15

(2): Dimethylpolysiloxane (R_1 is a methyl group, whereas R_2 is a hydroxyl group, n = 7,000): 3

(3): Dermatan sulfate: 0.001

(4): Silicone-polyether copolymer (KF 945 (A), manufactured by Toray Silicone Co.; viscosity: 100 cps; molecular weight: Approximately 3,000).

(5): Ethyl alcohol (99%): 5

(6): Trichloromonofluoroethane: 35

(7): Dichlorodifluoromethane: 40.999

A solubilized mixture of (1) ~ (5) was filled [into a can?], and after the propellant gases (6) & (7) had subsequently been filled into the same, an aerosol spray was obtained.

Application Example 8: Foamy aerosol

(1): Decamethylcyclopentasiloxane: 20

(2): Dimethylpolysiloxane (R_1 is a methyl group, whereas R_2 is a hydroxyl group, n = 6,000): 5

(3): Organic silicone resin {expressed by average formula (CH_3 1.8 SiO 1.1 with $[(CH_3)_2SiO_{1/2}] : [SiO_2] = 1.5 : 1$; molecular weight: Approximately 5,000): 2

(4): Silicone-polyether copolymer {Toray Silicone KF 945 (A); viscosity: 100 cps MW: Approximately 3,000): 4

(5): Dipropylene glycol: 5

(6): Polyoxyethylene (40 mole adduct) cured castor oil ester: 3

(7): Behenyl trimethyl ammonium chloride: 0.5

(8): Hyaluronic acid: 0.1 /6

(9): Ethanol (95%): 5

(10): Ion-exchanged water: 52.5

(11): Liquid petroleum gas

After a solubilized mixture of (1), (2), (3), & (4) had been added to a solution of (5), (6), & (7), the contents were emulsified. Next, the aforementioned emulsified mixture was added to & mixed with a solution of (8), (9), & (10). Next, the obtained feed liquid mixture was filled into a can, and after the propellant gas of (11) had subsequently been filled into the same, a foamy aerosol was obtained.

Excellent luster, silkiness, and conditioning effects were acknowledged in Application Examples 5 ~ 8.

Patent Applicant: Shiseido Co., Ltd.